

## Electrical and Thermal Properties of C60-filled SWNT

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We measured resistivity  $\rho$ , thermal conductivity  $\kappa$  and thermopower  $S$  vs. temperature of highly filled C60@SWNT ("peapods") and unfilled control buckypapers. The degree of filling was characterized by HRTEM, XRD and weight uptake. Filling induces a reduction in  $\rho(300\text{K})$  by only 6 decades less than with potassium doping. Also,  $\rho(T)$  remains non-metallic from 1.5 to 300 K upon filling, whereas  $\rho(T)$  after K-doping is metallic. We conclude that the charge transfer between C60 and SWNT is very small. The low-T divergence of  $\rho(T)$ , typical of SWNT ropes, mats and buckypapers, is partially suppressed by the C60 chains. This suggests that chain segments short out some of the non-conducting regions which dominate  $\rho$  at low T. Filling enhances  $\kappa$  by 10-20 consistent with the addition of a soft longitudinal acoustic phonon branch due to the 1-D chains which carries heat in parallel with the much stiffer LA tube modes.  $S(T)$  is higher in the control sample at all temperatures, which we explain by a combination of a) C60@SWNT blocking some of the oxygen doping sites, and b) weak disorder on the 1-D chain reducing the mean free path of tube phonons and thus the phonon drag contribution.